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Section II. (REMARKS)

The pending claims in the application are 1-16, 18, 20-41, 43, and 45-63.

Evidence Required to Establish Common Ownership

Applicants hereby declare and affirm that U.S. Patent No. 6,943,139, filed on October 31, 2002 in the name of Korzenski et al., and having an earliest publication date of May 6, 2004,¹ was, at the time the invention of U.S. Application Serial No. 10/790,535 (the presently pending application) was made, owned by Advanced Technology Materials, Inc.

Allowable Subject Matter

In the May 30, 2006 Office Action, the Examiner indicated that claims 16-19, 41-45 and 57 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants acknowledge same.

Amendment to the Claims

Claim 1 has been amended to incorporate a portion of the subject matter of original claims 16 and 18. Claim 25 has been correspondingly amended.

Claims 12 and 38 have been amended to excise the term "non-ionic" from the body of the claims.

Claim 37 has been amended to more adequately define the composition in the method claim.

Claim 45 has been amended to change the claim dependency.

Claim 55 has been amended to broaden the range of the etchant species to include 0.1 wt. %, consistent with the composition disclosed in paragraph [0057], and to define the possible etchant species.

¹ U.S. Patent Application Publication No. 2004/0087456.

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Claim 56 has been amended herein to recite that the pre-cleaning composition includes an oxidizing agent. Support for this amendment can be found in the instant application at paragraph [0048].

Support for new claims 60 and 61 can be found inherently in paragraphs [0001] and [0019].

Support for new claims 62 and 63 can be found, expressly and inherently, in paragraphs [0001] and [0025].

No new matter has been added herein.

Rejection of Claims and Traversal Thereof

In the May 30, 2005 Office Action:

claims 12 and 38 were rejected under 35 U.S.C. §112, second paragraph;

claims 1-4, 7-10, 15, 20, 25-28, 30, 32-36, 40, and 49-52 were rejected under 35 U.S.C. §102(b) as being anticipated by Mullee et al. (U.S. Patent No. 6,500,605) (hereinafter Mullee '605);

claim 55 was rejected under 35 U.S.C. §102(e) as being anticipated by DeYoung et al. (U.S. Patent No. 6,669,785);

claims 29, 56, 58 and 59 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mullee '605;

claims 5-6 and 31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mullee '605 in view of Mullee (U.S. Patent No. 6,306,564);

claims 11, 13, 37 and 39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mullee '605 in view of Douglas et al. (U.S. Patent No. 5,868,862);

claims 12, 14, and 38 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mullee

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'605, further in view of Douglas et al. and further in view of Jureller et al. (U.S. Patent No. 5,676,705);

claims 1-13, 15, 20-21, 23-33, 35-40, 46, 48, and 51-55 were rejected under 35 U.S.C. §103(a) as being unpatentable over Joyce et al. (U.S. Patent No. 6,764,552); and

claims 1-13, 21-39, and 46-55 were rejected under 35 U.S.C. §103(a) as being unpatentable over Korzenski et al. (U.S. Patent No. 6,943,139).

These rejections are traversed and reconsideration of the patentability of the pending claims is requested in light of the following remarks.

Rejection under 35 U.S.C. §112, second paragraph

In the May 30, 2006 Office Action, claims 12 and 38 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner indicated that some of the members of the Markush group are not non-ionic surfactants.

In response, applicants have excised the term "non-ionic" from claims 12 and 38 thereby obviating this rejection. Withdrawal of the rejection of claims 12 and 38 under §112, second paragraph, is respectfully requested.

Rejections under 35 U.S.C. §102

1. In the May 30, 2006 Office Action, claims 1-4, 7-10, 15, 20, 25-28, 30, 32-36, 40, and 49-52 were rejected under 35 U.S.C. §102(b) as being anticipated by Mullee et al. (U.S. Patent No. 6,500,605) (hereinafter Mullee '605). Applicants traverse such rejection.

Claim 1 has been amended herein to recite:

"A supercritical fluid (SCF) based composition comprising at least one co-solvent, at least one etchant species, at least one surface passivator, a binder interactive with silicon-containing particulate material to enhance removal thereof,

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deionized water, and optionally at least one surfactant, wherein said binder comprises a polymeric species derived from at least one ethylenically unsaturated reactant, and wherein said composition is useful for removing silicon-containing particulate material from the surface of a semiconductor wafer." (emphasis showing claim amendment(s))

Claim 25 has been correspondingly amended.

According to the Examiner, Mullee '605 teaches a method of removing photoresist and residue from a wafer following a medium dose ion implant wherein the method begins by maintaining supercritical carbon dioxide, a solvent and aqueous fluoride in contact with the wafer, wherein the solvent used includes glacial acetic acid, which the Examiner contends reads on applicants' binder.

Applicants are unclear why the Examiner feels as though glacial acetic acid qualifies as a binder, however, to advance prosecution, applicants have amended claim 1 to recite that the binder comprises a polymeric species derived from at least one ethylenically unsaturated reactant. Glacial acetic acid is not considered a polymeric species and as such, claims 1 and 25, and the claims depending therefrom, are not anticipated by Mullee '605. Furthermore, Mullee '605 fails to motivate or suggest the inclusion of a polymeric species derived from at least one ethylenically unsaturated reactant in the Mullee '605 composition.

Withdrawal of the rejection of claims 1-4, 7-10, 15, 20, 25-28, 30, 32-36, 40, and 49-52 under §102(b) in view of Mullee '605 is respectfully requested.

2. In the May 30, 2006 Office Action, claim 55 was rejected under 35 U.S.C. §102(e) as being anticipated by DeYoung et al. (U.S. Patent No. 6,669,785) (hereinafter DeYoung). Applicants traverse such rejection.

According to the Examiner:

"DeYoung teaches a fluid composition useful for cleaning a microelectronic substrate, comprising from 0.0001, 0.0005 to 5, 10 or 20 percent by weight of an adduct of hydrogen fluoride and a Lewis base; and from 40 or 50 to 99.999 percent by weight of liquid or supercritical carbon dioxide, wherein the composition is

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aqueous or nonaqueous, and the composition may further comprise from 0.001 or 0.1 percent to 30 or 40 percent by weight of a cosolvent, and/or from 0.001 to 1, 3 or 5 percent by weight of a surfactant. DeYoung teaches the limitations of the instant claim. Hence, DeYoung anticipates the claim”

Applicants vigorously disagree.

Applicants' claim 55 recites:

“A composition comprising about 85.0% to about 99.0% SCF, about 0.01% to about 15.0% co-solvent, about 0.1% to about 5.0% etchant, and optionally about 0% to about 3.0% surfactant, based on the total weight of the composition, wherein the etchant comprises triethylamine trihydrofluoride, wherein said composition is useful for removing silicon-containing particulate material from the surface of a semiconductor wafer.”

Importantly, the Federal Circuit recently ruled on whether the disclosure of a broad range in a reference necessarily anticipates a specific range in a claim. The court in *Atofina v. Great Lakes Chemical Corp.*, 78 U.S.P.Q.2d 1417 (Fed. Cir. 1996) ruled that there are circumstances where it does not. Specifically, the court stated:

“[i]t is well established that the disclosure of a genus in the prior art is not necessarily a disclosure of every species that is a member of that genus. See, e.g., *In re Baird*, 16 F.3d 380, 382 [29 USPQ2d 1550] (Fed. Cir. 1994). There may be many species encompassed within a genus that are not disclosed by a mere disclosure of the genus. On the other hand, a very small genus can be a disclosure of each species within the genus. *In re Petering*, 301 F.2d 676, 682 [133 USPQ 275] (C.C.P.A. 1962); see also *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1380 [58 USPQ2d 1508] (Fed. Cir. 2001) (“[T]he disclosure of a small genus may anticipate the species of that genus even if the species are not themselves recited.”).” *Id.* at 1423 (emphasis added)

In the *Atofina* case, the claimed temperature range for the synthesis of difluoromethane was 330-450°C (hereinafter “the claimed range”) and the temperature range disclosed in the prior art was 100-500°C (hereinafter “the range in the prior art”). The Examiner and the lower court ruled that the claimed range was anticipated by the range in the prior art, however, the Federal Circuit reversed these findings, stating that:

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"[g]iven the considerable difference between the claimed range and the range in the prior art, no reasonable fact finder could conclude that the prior art describes the claimed range with sufficient specificity to anticipate this limitation of the claim."

Id. at 1423 (emphasis added)

Turning to the present case, the claimed ranges and the DeYoung prior art ranges are tabulated hereinbelow:

	claimed range/wt. %	DeYoung range/wt. %
SCF	about 85.0% to about 99.0%	40 or 50 to 99.999%
co-solvent	about 0.01% to about 15.0%	0.001 or 0.1 to 30 or 40%
etchant	about 0.25% to about 5.0%	0.0001, 0.0005 to 5, 10 or 20%
optional surfactant	about 0% to about 3.0%	0.001 to 1, 3, or 5%

Comparing the claimed ranges relative to those disclosed in DeYoung, it can be seen that the *Atofina* ruling may be applied to the present case - DeYoung describes very broad ranges (i.e., the genus) while applicants' claim 55 relates to narrower ranges (i.e., the species) within the DeYoung genus. No reasonable fact finder could conclude that DeYoung describes the claimed range with sufficient specificity to anticipate applicants' claim 55.

In conclusion, DeYoung does not anticipate applicants' claim 55. Withdrawal of the rejection of claim 55 under §102 in view of DeYoung is respectfully requested.

Rejections under 35 U.S.C. §103

1. In the May 30, 2006 Office Action, claims 29, 56, 58 and 59 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mullee '605. Applicants traverse such rejection.

Applicants have amended claim 56 herein to recite:

"A method of removing silicon-containing particulate matter from a semiconductor wafer surface having same thereon, said method comprising:

pre-cleaning the wafer surface with a SCF-based pre-cleaning composition comprising a SCF and an aqueous-based pre-cleaning formulation, wherein the

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aqueous-based pre-cleaning formulation comprises
an oxidizing agent; and

contacting the wafer surface with a SCF-based composition comprising a SCF, at least one co-solvent, at least one etchant species, and optionally at least one surfactant, for sufficient time and under sufficient contacting conditions to remove the silicon-containing particulate matter from the surface of the semiconductor wafer." (emphasis added showing claim amendment(s))

It can be seen that the aqueous-based pre-cleaning formulation includes an oxidizing agent to "reoxidize the surface" (see, instant application, paragraph [0048]).

According to the Examiner:

"It would have been obvious to one of ordinary skill in the art at the time the invention was made to reasonably expect . . . the cleaning method of Mullee '605 to read on the pre-cleaning step as well, because a repetition of step [sic] is within the level of ordinary skill in the art." (see the May 30, 2006 Office Action, paragraph bridging pages 4 and 5)

Applicants vigorously disagree. Although a repetition of exactly the same steps to achieve the same end result may be obvious, in the present case the pre-cleaning formulation is used to oxidize the surface, i.e., using the pre-cleaning composition including oxidizing agent, and thereafter, the SCF-based composition is used to remove silicon-containing particulate matter. Applicants' claim 56 does not qualify as a mere repetition of steps. Moreover, there is no motivation, teaching or suggestion in Mullee '605 to clean a surface with a composition including an oxidizing agent, much less a pre-cleaning composition including an oxidizing agent.

In conclusion, it can be seen that Mullee '605 does not motivate, teach or suggest every limitation of applicants' claim 56. Accordingly, one of the requirements needed to establish a *prima facie* case of obviousness has not been met. See, *In re Royka*, 180 USPQ 580 (CCPA 1974). Withdrawal of the rejection of claims 29 and 56, and claims 58 and 59 depending therefrom, under §103(a) in view of Mullee '605 is respectfully requested.

2. In the May 30, 2006 Office Action, claims 5-6 and 31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mullee '605 in view of Mullee (U.S. Patent No. 6,306,564)

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(hereinafter Mullee '564). Applicants traverse such rejection.

As discussed hereinabove, Mullee '605 fails to motivate, teach or suggest the inclusion of a polymeric species derived from at least one ethylenically unsaturated reactant. The inclusion of Mullee '564 fails to cure this deficiency.

Mullee '564 discloses the possible inclusion of N-Methyl Pyrrolidone (NMP), diglycol amine, hydroxyl amine, tertiary amines, catechol, ammonium fluoride, ammonium bifluoride, methylacetooacetamide, ozone, propylene glycol monoethyl ether acetate, acetylacetone, dibasic esters, ethyl lactate, CHF_3 , BF_3 , other fluorine containing chemicals, or a mixture of any of the above chemicals, in a supercritical CO_2 composition. In addition, alcohols, ethers, and/or glycols, such as acetone, diacetone alcohol, dimethyl sulfoxide (DMSO), ethylene glycol, methanol, ethanol, propanol, or isopropanol (IPA), may be added to a supercritical CO_2 composition. Clearly, none of these species qualifies as a polymeric species derived from at least one ethylenically unsaturated reactant, as required in applicants' claims, nor does the disclosure of the Mullee '564 compounds motivate, teach or suggest the inclusion of a polymeric species derived from at least one ethylenically unsaturated reactant.

In conclusion, it can be seen that Mullee '605 in view of Mullee '564 does not motivate, teach or suggest every limitation of applicants' claims 1 and 25 and hence rejected claims 5, 6 and 31. Accordingly, one of the requirements needed to establish a *prima facie* case of obviousness has not been met. Withdrawal of the rejection of claims 5, 6 and 31 under §103(a) in view of Mullee '605 and Mullee '564 is respectfully requested.

3. In the May 30, 2006 Office Action, claims 11, 13, 37 and 39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mullee '605 in view of Douglas et al. (U.S. Patent No. 5,868,862) (hereinafter Douglas). Applicants traverse such rejection.

As discussed hereinabove, Mullee '605 fails to motivate, teach or suggest the inclusion of a polymeric species derived from at least one ethylenically unsaturated reactant. The inclusion of Douglas fails to cure this deficiency.

Douglas relates to a method of removing inorganic contamination from a native oxide layer, said method including the removal of converted inorganic contamination with a solvent agent.

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Solvent agents disclosed include polar gas (preferably CO, COS, NO, NH₃, or NF₃), nonpolar gases (preferably N₂, H₂, O₂, or F₂), polar SCF (preferably NO₂), nonpolar SCF (preferably CO₂), a polar species (preferably water, ethanol, methanol, acetone, or glycol), a nonpolar species (preferably tetrahydrofuran, or dimethylformamide), surfactants, detergents, or amphoteric materials (preferably sodium dodecyl sulfate, quaternary ammonium salts, or cationic, anionic, nonionic or zwitterionic surfactants), or a chelating agent (preferably beta-diketone, fluorinated or unfluorinated crown ether), which is preferably included in a supercritical fluid (preferably CO₂). Clearly, none of these species qualifies as a polymeric species derived from at least one ethylenically unsaturated reactant, as required in applicants' claims, nor does the disclosure of the Douglas species motivate, teach or suggest the inclusion of a polymeric species derived from at least one ethylenically unsaturated reactant.

In conclusion, it can be seen that Mullee '605 in view of Douglas does not motivate, teach or suggest every limitation of applicants' claims 1 and 25 and hence rejected claims 11, 13, 37 and 39. Accordingly, one of the requirements needed to establish a *prima facie* case of obviousness has not been met. Withdrawal of the rejection of claims 11, 13, 37 and 39 under §103(a) in view of Mullee '605 and Douglas is respectfully requested.

4. In the May 30, 2006 Office Action, claims 12, 14, and 38 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mullee '605, further in view of Douglas et al. and further in view of Jureller et al. (U.S. Patent No. 5,676,705) (herein after Jureller). Applicants traverse such rejection.

As discussed hereinabove, Mullee '605 in view of Douglas fails to motivate, teach or suggest the inclusion of a polymeric species derived from at least one ethylenically unsaturated reactant. The inclusion of Jureller fails to cure this deficiency.

Jureller relates to a method of dry cleaning fabrics using densified CO₂ and a surfactant, wherein the surfactant has a polysiloxane, a branched polyalkylene oxide and a halocarbon group. Again, none of these species disclosed in Jureller qualifies as a polymeric species derived from at least one ethylenically unsaturated reactant, as required in applicants' claims, nor does the disclosure of the Jureller species motivate, teach or suggest the inclusion of a polymeric species derived from at least one ethylenically unsaturated reactant.

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In conclusion, it can be seen that Mullee '605 in view of Douglas and Jureller does not motivate, teach or suggest every limitation of applicants' claims 1 and 25 and hence rejected claims 12, 14 and 38. Accordingly, one of the requirements needed to establish a *prima facie* case of obviousness has not been met. Withdrawal of the rejection of claims 12, 14, and 38 under §103(a) in view of Mullee '605, Douglas, and Jureller is respectfully requested.

5. In the May 30, 2006 Office Action, claims 1-13, 15, 20-21, 23-33, 35-40, 46, 48, and 51-55 were rejected under 35 U.S.C. §103(a) as being unpatentable over Joyce et al. (U.S. Patent No. 6,764,552) (hereinafter Joyce). Applicants traverse such rejection.

Joyce relates to solutions including supercritical carbon dioxide and at least one reagent dissolved therein to facilitate removal of waste material from wafers. The reagent may include an ammonium carbonate or bicarbonate, and combinations of such reagents. The solution may include one or more co-solvents, chelating agents, surfactants, and anti-corrosion agents as well (see, Joyce, Abstract).

With regards to claims 1 and 25 and the claims depending therefrom, the Examiner indicated that:

"[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to prepare a composition comprising carbon dioxide, at least one solvent like ethanol and water, ammonium fluoride, triethanolamine (equivalent to binder), chelating agent (equivalent to passivator) and surfactant because the teachings of Joyce encompass these ingredients."

Applicants vigorously disagree.

As discussed hereinabove, applicants have amended claims 1 and 25 herein to define the binder to include a polymeric species derived from at least one ethylenically unsaturated reactant. Notably, the disclosure of triethanolamine, which is a fairly simple covalent compound, in Joyce does not motivate, teach or suggest the inclusion of a polymeric species derived from at least one ethylenically unsaturated reactant.

As such, Joyce fails to motivate, teach or suggest every limitation of applicants' claims 1 and 25, and claims depending therefrom. Accordingly, one of the requirements needed to establish a *prima facie* case of obviousness has not been met. Withdrawal of the rejection of claims 1-13,

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15, 20-21, 23-33, 35-40, 46, 48, and 51-54 under §103(a) in view of Joyce is respectfully requested.

Claim 55 has been amended herein to recite:

"A composition comprising about 85.0% to about 99.0% SCF, about 0.01% to about 15.0% co-solvent, about 0.1% to about 5.0% etchant, and optionally about 0% to about 3.0% surfactant, based on the total weight of the composition, wherein the etchant comprises triethylamine trihydrofluoride, wherein said composition is useful for removing silicon-containing particulate material from the surface of a semiconductor wafer." (emphasis showing claim amendment(s))

Importantly, the Examiner did not attempt to establish a *prima facie* case on obviousness for claim 55. Regardless, Joyce does not motivate, teach or suggest a composition comprising about 85.0% to about 99.0% SCF, about 0.01% to about 15.0% co-solvent, about 0.1% to about 5.0% etchant, and optionally about 0% to about 3.0% surfactant, wherein the etchant comprises triethylamine trihydrofluoride, as claimed by applicants herein.

The Examiner is respectfully reminded that in order to make a legally sufficient rejection based on a modification of the reference disclosure, the areas of the reference that suggest the modification must be explained with specificity. *See, Ex parte Humphreys*, 24 U.S.P.Q.2d 1255, 1262 (B.P.A.I. 1992). The Examiner may not reconstruct applicants' claimed invention in light of applicants' own disclosure, without any suggestive basis in the prior art reference itself.

Accordingly, Joyce does not motivate, teach or suggest every limitation of applicants' claim 55. Withdrawal of the rejection of claim 55 under §103(a) in view of Joyce is respectfully requested.

6. In the May 30, 2006 Office Action, claims 1-13, 21-39, and 46-55 were rejected under 35 U.S.C. §103(a) as being unpatentable over Korzenski et al. (U.S. Patent No. 6,943,139) (hereinafter Korzenski) in view of Mullee '605. Applicants traverse such rejection.

As stated hereinabove, Korzenski, which qualifies as a §102(e) reference, was commonly owned by Advanced Technology Materials, Inc. at the time of filing of the present application. Consistent with the provisions of MPEP §706.02(l)(2), the statement hereinabove by applicants

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disqualifies U.S. Patent No. 6,943,139 to Korzenski from being used in a rejection under 35 U.S.C. §103(a) against claims of the present application. See also, MPEP §§ 706(l)(1).

As a result of the disqualification of the primary reference Korzenski, the only reference remaining to support the rejection of claims 1-13, 21-39, and 46-55 under §103(a) is Mullee '605, which as discussed previously, does not motivate, teach or suggest applicants' claimed invention.

Withdrawal of the rejection of claims 1-13, 21-39, and 46-55 as being unpatentable over Korzenski in view of Mullee '605 is respectfully requested.

Fees Payable

Four (4) dependent claims have been cancelled herein while four (4) claims have been added herein, one (1) of which is independent. As such, an added claims fee of $[(4 \times \$50.00) + (1 \times \$200.00)] - (4 \times \$50.00) = \200.00 for the independent claim is due.

The total fee of \$200.00 is authorized to be withdrawn from Deposit Account No. 13-4365 of Moore & Van Allen PLLC.

Conclusion

Claims 1-16, 18, 20-41, 43, and 45-63 are now in form and condition for allowance. Favorable action is hereby requested. Authorization is hereby given to charge any deficiency in applicable fees for this response to Deposit Account No. 13-4365 of Moore & Van Allen PLLC. If any additional issues remain, the Examiner is requested to contact the undersigned attorney at (919) 286-8090 to discuss same.

Respectfully submitted,
MOORE & VAN ALLEN PLLC

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